at1124exam: Radicals and Squares (v822)

Question 1

Simplify the radical expressions.

$$\sqrt{99} \qquad\qquad \sqrt{28} \qquad\qquad \sqrt{18}$$

$$\sqrt{3\cdot3\cdot11} \qquad\qquad \sqrt{2\cdot2\cdot7} \qquad\qquad \sqrt{3\cdot3\cdot2}$$
$$3\sqrt{11} \qquad\qquad 2\sqrt{7} \qquad\qquad 3\sqrt{2}$$

Question 2

Find all solutions to the equation below:

$$3\left((x+7)^2 + 7\right) \;=\; 69$$

First, divide both sides by 3.
$$(x+7)^2 + 7 = 23$$

Then, subtract 7 from both sides.
$$(x+7)^2 = 16$$

Undo the squaring. Remember the plus-minus symbol.
$$x + 7 = \pm 4$$

Subtract 7 from both sides.
$$x = -7 \pm 4$$

So the two solutions are $x = -3$ and $x = -11$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 18x = -56$$

$$x^2 - 18x + 81 = -56 + 81$$
$$x^2 - 18x + 81 = 25$$
$$(x - 9)^2 = 25$$
$$x - 9 = \pm 5$$
$$x = 9 \pm 5$$
$$x = 14 \qquad \text{or} \qquad x = 4$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 4x^2 + 24x + 42$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 4 .
$$y = 4(x^2 + 6x) + 42$$

We want a perfect square. Halve 6 and square the result to get 9 . Add and subtract that value inside the parentheses.
$$y = 4(x^2 + 6x + 9 - 9) + 42$$

Factor the perfect-square trinomial.
$$y = 4((x + 3)^2 - 9) + 42$$

Distribute the 4.
$$y = 4(x + 3)^2 - 36 + 42$$

Combine the constants to get **vertex form**:

$$y = 4(x + 3)^2 + 6$$

The vertex is at point $(-3, 6)$.